

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
13 January 2005 (13.01.2005)

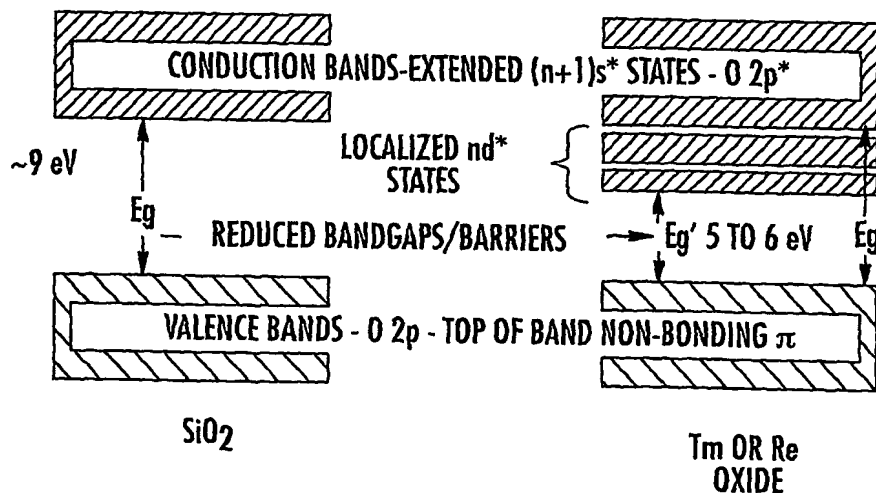
PCT

(10) International Publication Number
WO 2005/004198 A2

- (51) International Patent Classification⁷: H01L Sandy Ridge Rd., State College, Pennsylvania 16803-1247 (US).
- (21) International Application Number: PCT/US2004/018863 (74) Agent: MYERS BIGEL SIBLEY & SAJOVEC, P.A.; P.O. Box 37428, Raleigh, North Carolina 27627 (US).
- (22) International Filing Date: 10 June 2004 (10.06.2004) (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 60/478,586 13 June 2003 (13.06.2003) US
- (71) Applicants (for all designated States except US): NORTH CAROLINA STATE UNIVERSITY [US/US]; 2401 Research Drive, Campus Box 8210, Raleigh, North Carolina 27695-8210 (US). THE PENNSYLVANIA STATE RESEARCH FOUNDATION [US/US]; 304 Old Main, University Park, Pennsylvania 16802 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): LUCOVSKY, Gerald [US/US]; 124 Lockwood West Drive, Cary, North Carolina 27511-9744 (US). SCHLOM, Darrell [US/US]; 154
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: COMPLEX OXIDES FOR USE IN SEMICONDUCTOR DEVICES AND RELATED METHODS



(57) Abstract: A semiconductor device includes a semiconductor substrate, a first oxide layer on the semiconductor substrate including an element from the semiconductor substrate, and a second oxide layer on the first oxide layer opposite the semiconductor substrate. The second oxide layer includes a stoichiometric, single-phase complex oxide represented by the formula: $A_h B_j O_k$, or equivalently $(A_m O_n)_a (B_q O_r)_b$ in which the elemental oxide components, $(A_m O_n)_a$ and $(B_q O_r)_b$ are combined so that $h = j$ or, equivalently, $ma = bq$, and a, b, h, j, k, m, n, q and r are non-zero integers; and wherein: A is an element of the lanthanide rare earth elements of the periodic table or the trivalent elements from cerium to lutetium; and B is an element of the transition metal elements of groups IIIB, IVB or VB of the periodic table.

WO 2005/004198 A2



Published:

— without international search report and to be republished
upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.